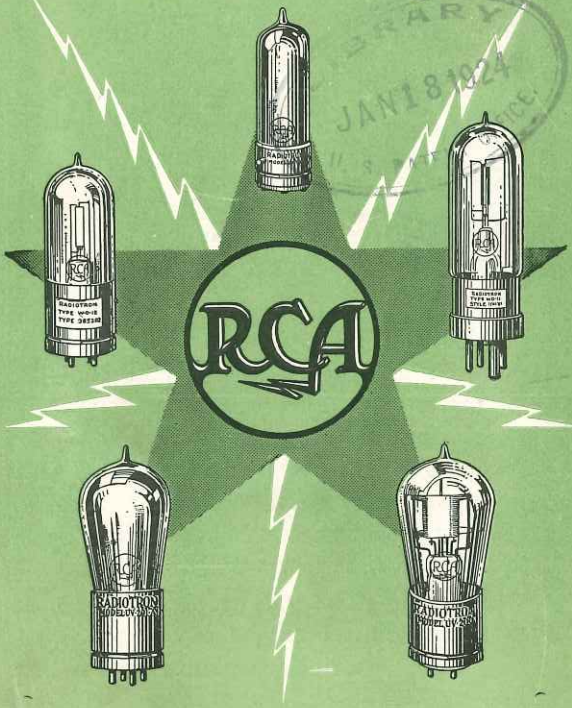
Radiotrons

To Get Distance ~ and Get it Clearly



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RADIOTRONS
for
Detection and Amplification

FOR the proper operation of Radiotrons as detectors it is of utmost importance that the various connections and the values of the apparatus be as shown in figure 1, and the accompanying table "Radiotron Characteristics". As shown in the diagrams, the grid return lead for Radiotrons UV-199, UV-200, UV-201-A, WD-11, and WD-12 connects with the positive side of the filament battery.

Another point of great importance is the value of the grid leak. For UV-200 the value is ½ to 2 megohms, for WD-11 and WD-12 it is 2 to 3 and for UV-199 and 201-A 2 to 5 megohms is satisfactory for average work while 5 to 9 is somewhat better for detecting very weak signals.

When Radiotrons are used as amplifiers small changes in the voltage of the signals as applied to to them between grid and filament, cause large changes in the plate current, and in order to obtain faithful reproduction of voice and music, the grid at no time should draw any electron current. Should this occur, the plate current, during this interval would be less than normal, while during the remaining time it would be normal. Naturally, such an action would result in unfaithful reproduction or distortion. In order to obviate this, the grid must be maintained at a constant negative value in respect to the filament. This is known as biasing the grid. Where ½ to 1 volt negative bias is required (see notes 1, 2 and 3 on Characteristic Table), the connections should be as shown in fig. 2. Where greater values are necessary a "C" battery is connected as shown in fig. 3.

By consulting these diagrams, the accompanying text and the table of characteristics, the user is assured of the very finest results obtainable with vacuum tubes.

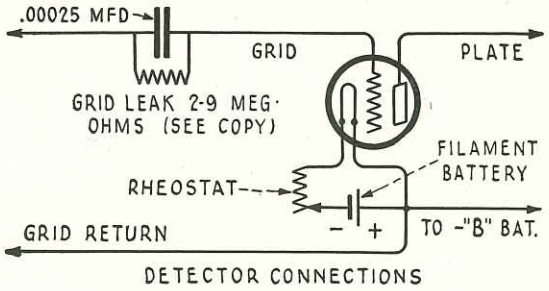

FIG. 1

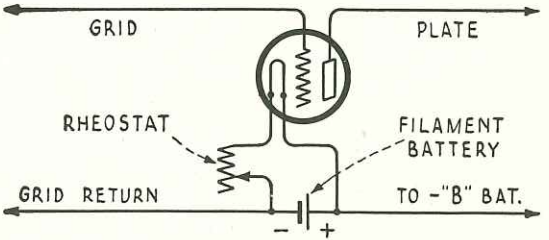

FIG. 2

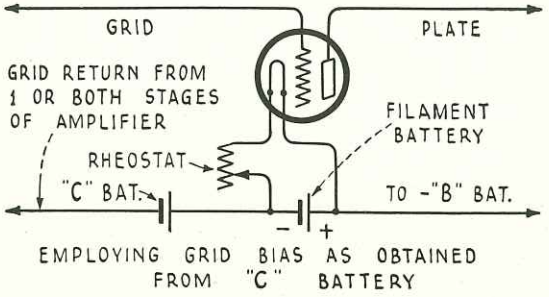

FIG. 3

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FOR SALE BY

Radiotron UV-199

The Little Tube of Big Performance

RADIOTRON UV-199 is the smallest of the Radiotrons, 3½" high and 1" in diameter, with a filament current consumption of only .06 ampere. Three No. 6 dry cells in series will energize the filament. It is not only an exceptional detector and audio-frequency amplifier, but is an excellent radio frequency amplifier as well.

As in other tubes, the proper grid bias depends, in amount, on the plate voltage employed. Used as an amplifier, plate voltages up to 80 may be employed if the correct grid bias, shown elsewhere in this folder, is provided.

It took eight years of research to develope the filament of UV-199. The result is a marked improvement over tungsten filaments for it provides a high emission at low filament temperatures, a quietness of operation and long life, together with ruggedness and uniformity of operation. It is recommended that the filament be operated at constant voltage, but constant current operation does not mean serious loss of filament life.

The rheostat should have a maximun resistance of 30 ohms for operation from three dry cells in series; or 60 ohms for a six volt storage battery.

Many adjustments can most advantageously be made while the set is in operation and it is strongly advised that a protective resistance, consisting of a 10 watt, 110 volt tungsten lamp be placed in one lead of the plate battery, preferably immediately next to one battery terminal in order to prevent burn-outs by accidentally applying the plate voltage to the filament. Cold, the resistance of the protective lamp is very low, but in the case of a short circuit, the filament becomes incandescent and the resistance goes up enormously which is a valuable protective feature.

This Radiotron might aptly be termed "the tube with nine lives" because the filament, when operated at too high a temperature causes the electron emission to fall off and the tube becomes inoperative. Should this occur, the plate battery should be disconnected and the filament lighted for about twenty minutes which will restore its life.

Radiotron UV-199 . . . . $6.50

Radiotron UV-200

The Long Distance Detector Tube

IN any receiving circuit either simple or complex, Radiotron UV-200 is the detector which embodies all the characteristics necessary for faultless performance. Where long distances are to be covered, where stability of operation is desired, where long life and its resultant low cost are desired, where detector tubes of uniform characteristics are required for critical receiving adjustments, in fact wherever real results are sought, there is but one answer to the detector tube question —Radiotron UV-200.

The Radiotron UV-200 is made with a standard four-prong bayonet base designed to fit the RCA standard VT sockets UR-542 and UP-552.

In using this tube as a detector, a grid condenser of approximately .00025 mfd. should be connected in series with the grid.

Where a variable grid condenser is used, the UC-1820 is recommended. With this condenser no grid leak mounting is required, for the condenser is fitted with a mounting which will hold any RCA standard grid leak.

Where the desired voltage is not more than 22½, the "A" battery potentiometer PR-536 permits an extension of the life of the "B" battery. When the normal voltage of the 18 volt tap is too low, the connection from the potentiometer may be made to the 22½ volt tap, thus using the cells between the 18 volt tap and the 22½ volt tap previously idle.

It is sometimes necessary to use more than 22½ volts with the UV-200 and when this is the case, instead of connecting the lead through the potentiometer to the 18 volt tap of the plate battery it should be connected to the 22½ volt terminal. This permits an adjustment between 22½ and 28 volts on the plate circuit.

Voltages in excess of 28 to 30 should not be applied to the plate of a Radiotron UV-200.

The normal voltage to be maintained at the filament terminals of Radiotron UV-200 lies within the range of 5 to 5.4 volts.

Radiotron UV-200 . . . . $5.00

Radiotron UV-201-A

A Newer and Better Radiotron

RADIOTRON UV-201-A is a new and improved high vacuum tube suitable for detection, radio-frequency amplification and audio-frequency amplification. It contains a new tungsten filament, the characteristics of which are long life, low power consumption, and low operating temperature. It consumes only one-quarter of an ampere (0.25 ampere). The base is the same as that of the UV-200 and the UV-201.

The electron emission from the filament of UV-201-A averages about five times that of the ordinary amplifying tube. The result is greatly improved loud speaker operation. The filament energy is one-quarter ampere. Used with a one tube set it may be operated from four dry cells in series.

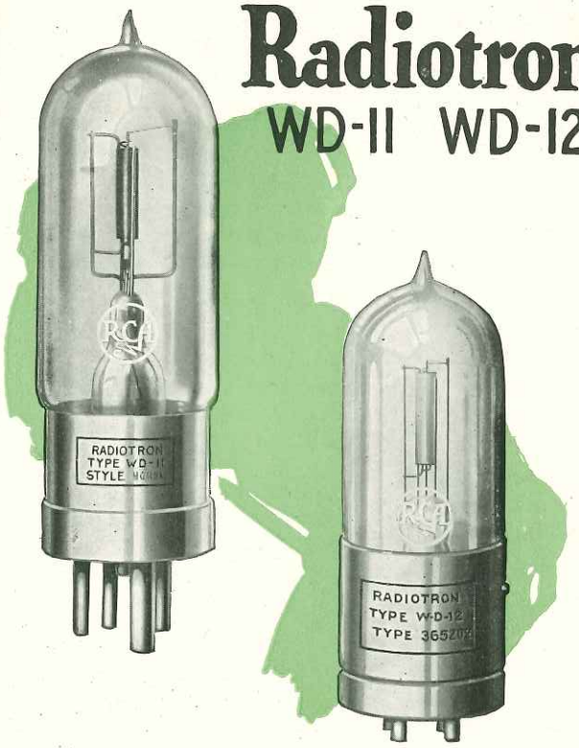
While this tube is not quite the equal of the UV-200 as a detector, its use in this capacity will give very excellent results. As an audio-frequency amplifier, too, its performance is excellent, delivering at least 50% more energy. Another of the outstanding features of the UV-201-A is the unusually high vacuum which insures uniform characteristics and quiet operation, a feature greatly desired by all tube users. UV-201-A can be used in any equipment that employs the ordinary tube and will give improved results.

In operation, if the filament voltage is supplied by a 6.0 volt battery, the resistance of the filament rheostat should be at least 4 ohms. If by accident the excessive filament or plate voltage should be applied to the tube, the tube may lose its activity. This may be restored ordinarily, however, by lighting the filament at rated voltage for ten to twenty minutes with plate voltage off. Failure of the filament is seldom due to actual burnout, unless very high voltage is applied. The end of useful life is indicated by a decrease in electron emission. This in turn is indicated by an increase in the filament voltage required for satisfactory operation.

To prevent noise from vibration the tubes should be mounted on cushion or spring supports. The best method is to mount them vertically.

Bulbs are often discolored during the process of manufacture, but this has no effect on the value of the tube or on its operation.

Radiotron UV-201-A . . . $6.50



Radiotron WD-11 WD-12

The Economical Dry Cell Tubes

RADIOTRONS WD-11 and WD-12 are two most useful and efficient vacuum tubes, designed for operation entirely on dry cells. The filament, which should glow not brighter than a dull red, consumes just about a quarter ampere (.25 ampere). This extremely low consumption makes possible filament operation on a single dry cell—a most important consideration where portability is desired, and where storage battery charging facilities are not available.

A single 22½ volt "B" battery unit will prove very satisfactory in the plate circuit, though potentials up to 80 volts may be employed.

Perhaps the strongest recommendation which can be made for Radiotrons WD-11 and WD-12 is their absolute freedom from tube noises. They are also very stable in operation. The electrical characteristics are such that WD-11 and WD-12 will work very successfully with any audio frequency transformer, but for the best results the Radio Corporation's model UV-712 transformer is highly recommended. It will also make for excellent reception to use the Radio Corporation's model UV-1714 radio frequency transformer in reaching out for greater range.

WD-11 and WD-12 are identical, except that WD-12 is designed to fit the standard four prong socket. WD-11 is furnished with Radiola Grand, Radiola Sr., Radiola Sr. Amplifier, and Radiola RS, and is likewise adapted for use in the WD socket.

Radiotron WD 11 or 12 . . $6.50

Radiotron UV-199

The Little Tube of Big Performance

RADIOTRON UV-199 is the smallest of the Radiotrons, 3½" high and 1" in diameter, with a filament current consumption of only .06 ampere. Three No. 6 dry cells in series will energize the filament. It is not only an exceptional detector and audio-frequency amplifier, but is an excellent radio frequency amplifier as well.

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It took eight years of research to develope the filament of UV-199. The result is a marked improvement over tungsten filaments for it provides a high emission at low filament temperatures, a quietness of operation and long life, together with ruggedness and uniformity of operation. It is recommended that the filament be operated at constant voltage, but constant current operation does not mean serious loss of filament life.

The rheostat should have a maximun resistance of 30 ohms for operation from three dry cells in series; or 60 ohms for a six volt storage battery.

Many adjustments can most advantageously be made while the set is in operation and it is strongly advised that a protective resistance, consisting of a 10 watt, 110 volt tungsten lamp be placed in one lead of the plate battery, preferably immediately next to one battery terminal in order to prevent burn-outs by accidentally applying the plate voltage to the filament. Cold, the resistance of the protective lamp is very low, but in the case of a short circuit, the filament becomes incandescent and the resistance goes up enormously which is a valuable protective feature.

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Radiotron UV-199 . . . . $6.50

Radiotron UV-200

The Long Distance Detector Tube

IN any receiving circuit either simple or complex, Radiotron UV-200 is the detector which embodies all the characteristics necessary for faultless performance. Where long distances are to be covered, where stability of operation is desired, where long life and its resultant low cost are desired, where detector tubes of uniform characteristics are required for critical receiving adjustments, in fact wherever real results are sought, there is but one answer to the detector tube question —Radiotron UV-200.

The Radiotron UV-200 is made with a standard four-prong bayonet base designed to fit the RCA standard VT sockets UR-542 and UP-552.

In using this tube as a detector, a grid condenser of approximately .00025 mfd. should be connected in series with the grid.

Where a variable grid condenser is used, the UC-1820 is recommended. With this condenser no grid leak mounting is required, for the condenser is fitted with a mounting which will hold any RCA standard grid leak.

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It is sometimes necessary to use more than 22½ volts with the UV-200 and when this is the case, instead of connecting the lead through the potentiometer to the 18 volt tap of the plate battery it should be connected to the 22½ volt terminal. This permits an adjustment between 22½ and 28 volts on the plate circuit.

Voltages in excess of 28 to 30 should not be applied to the plate of a Radiotron UV-200.

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The electron emission from the filament of UV-201-A averages about five times that of the ordinary amplifying tube. The result is greatly improved loud speaker operation. The filament energy is one-quarter ampere. Used with a one tube set it may be operated from four dry cells in series.

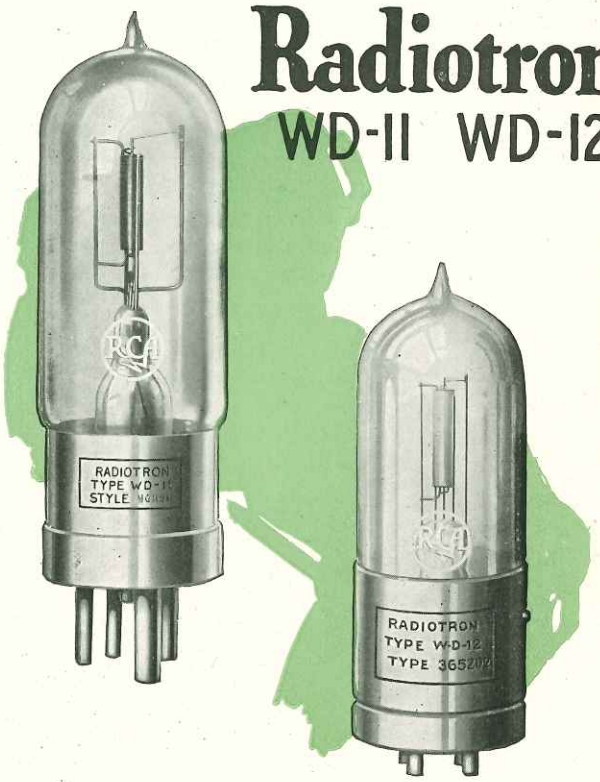
While this tube is not quite the equal of the UV-200 as a detector, its use in this capacity will give very excellent results. As an audio-frequency amplifier, too, its performance is excellent, delivering at least 50% more energy. Another of the outstanding features of the UV-201-A is the unusually high vacuum which insures uniform characteristics and quiet operation, a feature greatly desired by all tube users. UV-201-A can be used in any equipment that employs the ordinary tube and will give improved results.

In operation, if the filament voltage is supplied by a 6.0 volt battery, the resistance of the filament rheostat should be at least 4 ohms. If by accident the excessive filament or plate voltage should be applied to the tube, the tube may lose its activity. This may be restored ordinarily, however, by lighting the filament at rated voltage for ten to twenty minutes with plate voltage off. Failure of the filament is seldom due to actual burnout, unless very high voltage is applied. The end of useful life is indicated by a decrease in electron emission. This in turn is indicated by an increase in the filament voltage required for satisfactory operation.

To prevent noise from vibration the tubes should be mounted on cushion or spring supports. The best method is to mount them vertically.

Bulbs are often discolored during the process of manufacture, but this has no effect on the value of the tube or on its operation.

Radiotron UV-201-A . . . $6.50



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Radiotron WD 11 or 12 . . $6.50

Radiotron Characteristics

Radiotrons	Output	Filament Circuit Data			Plate Voltage		Dimensions Overall		For Detection		Plate Impedance (Approximate) in Ohms	Amplification Constant (Approximate)	Mutual Conductance in Micro-Mhos.	Plate Current in Milliamperes (With Zero Grid)	
	Watts (Rated)	Battery Source Voltage	Filament Terminal Voltage	Filament Current	Detector	Amplifier Except Notes	Height Maximum	Diameter Maximum	Grid Leak Megohms	Grid Condenser Mfd.				Plate Voltage	Plate Current
WD-11		1 5	1.1	0.25	20 to 45	40 to 100 see Note (2)	4⅜″	1¼″	2 to 3	.00025	19,000 at 40 Volts 17,000 at 80 Volts	6.5	340*	20 40 80	0.3 1.2 3.9
WD-12		1.5	1 1	0 25	20 to 45	40 to 100 see Note (2)	3⅝″	1¼″	2 to 3	00025	19,000 at 40 Volts 17,000 at 80 Volts	6 5	340*	20 40 80	0.3 1.2 3.9
UV-199		4.5	3.0	0.06	20 to 45	40 to 100 see Note (3)	3½″	1″	†† 2 to 9	.00025	18,500 at 40 Volts at Zero Grid 16,000 at 80 Volts with minus 4.5 Volt Negative Grid	6.25	340*	20 40 60 80	0.25 1.1 2.4 3.9
UV-200		6 0	5.0	1.0	15 to 23 5		4⅝″	1¾″	½ to 2	.00025 to 0005	9,000			Detector: 0.25—1.0	
UV-201-A		6 0	5.0	0 25	20 to 45	40 to 120 see Note (1)	4⅝″	1¾″	†† 2 to 9	.00025	16,500 at 40 Volts at Zero Grid 12,500 at 100 Volts with minus 6 Volt Negative Grid	8.0	485*	40 60 80 90 100	1.0 2.6 4.8 6.0 7.5

NOTE 1

UV-201-A

Plate Voltage	Negative Grid Bias Voltage or "C" Battery
40	0 5 to 1.0
60	1 0 to 3 0
80	3 0 to 4 5
100	4.5 to 6 0
120	6 0 to 9.0

NOTE 2

WD-11 AND WD-12

Plate Voltage	Negative Grid Bias Voltage or "C" Battery
45	0
60	1 5
80 to 100	3 0

NOTE 3

UV-199

Plate Voltage	Negative Grid Bias Voltage or "C" Battery
40	0 5 to 1 0
60	1.0 to 3 0
80	4 5 to 6 0
100†	6 0 to 7 5

Note: These figures on Impedance, Amplification Constant, Mutual Conductance do not apply when tube is oscillating.

Note: All of above values are based on approximate averages taken over a long period of time. Individual tubes may vary somewhat from figures shown.

Note: The Amplification Constant in itself is not a direct measure of the amplification given by the tube. The mutual conductance more nearly represents the amplification given in ordinary circuits

* Mutual Conductance Values are at 40 Volts on Plate and Zero Grid.

† This voltage is not recommended for ordinary service. 80 volts (or four 22½ volt blocks) should not be exceeded except in very special cases.

†† A grid leak resistance between two and five megohms is satisfactory for average work A resistance between five and nine megohms is somewhat better for very weak signals.

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Radiotron Characteristics

Radiotrons	Output	Filament Circuit Data			Plate Voltage		Dimensions Overall		For Detection		Plate Impedance (Approximate) in Ohms	Amplification Constant (Approximate)	Mutual Conductance in Micro-Mhos.	Plate Current in Milliamperes (With Zero Grid)	
	Watts (Rated)	Battery Source Voltage	Filament Terminal Voltage	Filament Current	Detector	Amplifier Except Notes	Height Maximum	Diameter Maximum	Grid Leak Megohms	Grid Condenser Mfd.				Plate Voltage	Plate Current
D-11		1 5	1.1	0.25	20 to 45	40 to 100 see Note (2)	4⅜"	1¼"	2 to 3	.00025	19,000 at 40 Volts 17,000 at 80 Volts	6.5	340*	20 40 80	0.3 1.2 3.9
D-12		1.5	1 1	0 25	20 to 45	40 to 100 see Note (2)	3⅝"	1¼"	2 to 3	00025	19,000 at 40 Volts 17,000 at 80 Volts	6 5	340*	20 40 80	0.3 1.2 3.9
V-199		4.5	3.0	0 06	20 to 45	40 to 100 see Note (3)	3½"	1"	†† 2 to 9	.00025	18,500 at 40 Volts at Zero Grid 16,000 at 80 Volts with minus 4.5 Volt Negative Grid	6.25	340*	20 40 60 80	0.25 1.1 2.4 3.9
V-200		6 0	5.0	1.0	15 to 23 5		4⅝"	1¾"	½ to 2	.00025 to 0005	9,000			Detector: 0.25—1.0	
V-201-A		6 0	5.0	0 25	20 to 45	40 to 120 see Note (1)	4⅝"	1¾"	†† 2 to 9	.00025	16,500 at 40 Volts at Zero Grid 12,500 at 100 Volts with minus 6 Volt Negative Grid	8.0	485*	40 60 80 90 100	1.0 2.6 4.8 6.0 7.5

NOTE 1

UV-201-A

Plate Voltage	Negative Grid Bias Voltage or "C" Battery
40	0 5 to 1.0
60	1 0 to 3 0
80	3 0 to 4 5
100	4.5 to 6 0
120	6 0 to 9.0

NOTE 2

WD-11 AND WD-12

Plate Voltage	Negative Grid Bias Voltage or "C" Battery
45	0
60	1 5
80 to 100	3 0
.....	.....

NOTE 3

UV-199

Plate Voltage	Negative Grid Bias Voltage or "C" Battery
40	0 5 to 1 0
60	1.0 to 3 0
80	4 5 to 6 0
100†	6 0 to 7 5

Note: These figures on Impedance, Amplification Constant, Mutual Conductance do not apply when tube is oscillating.

Note: All of above values are based on approximate averages taken over a long period of time. Individual tubes may vary somewhat from figures shown.

Note: The Amplification Constant in itself is not a direct measure of the amplification given by the tube. The mutual conductance more nearly represents the amplification given in ordinary circuits

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